

C 334
29-15-97W

*Lithologic description of cuttings (part A) from drill hole USBM-01A
Horse Draw*

interval
feet
(meters)

Description	Depth interval feet (meters)
Tertiary	
Uinta Formation	
Siltstone, dusky-yellowish-brown (wet); grains mostly smoky quartz; trace of clear quartz and tiny pyrite fragments; no calcareous cement-----	210-225 (64.0-68.6)
Siltstone, as above, with trace of magnetite-----	225-240 (68.6-73.2)
Siltstone, as above, with more magnetite and pyrite; pyrite occurs in clumps of tiny crystals; trace of laminated siltstone and oil shale; very thin laminae-----	240-255 (73.2-77.7)
Same as above; no laminated material-----	255-270 (77.7-82.3)
Siltstone, as above; trace of very fine grained quartzitic sandstone; contains smoky quartz grains; no laminated material-----	270-295 (82.3-89.9)
Same as above; contains trace of oil shale as <1 mm fragments; trace of siltstone with calcite cement, subangular smoky quartz, and trace of clear quartz grains-----	295-310 (89.9-94.5)
Siltstone and very fine grained quartzitic sandstone; siltstone as above; traces of pyrite and magnetite; very thin laminae or lenses of yellowish-brown to dusky-yellowish-brown shale-----	310-365 (94.5-111.3)
Marlstone and siltstone; marlstone is very thinly laminated, pale yellowish brown and dark yellowish brown; siltstone is light gray to pale yellowish brown; minor amount of very fine grained sandstone of quartz grains, no calcareous cement; cuttings very fine-----	365-380 (111.3-115.8)
Marlstone, as above; trace of siltstone, no sandstone-----	380-425 (115.8-129.5)
No sample-----	425-440 (129.5-134.1)
Marlstone, as above, 95 percent of samples; dusk-yellowish-brown oil shale, 5 percent; trace pyrite-----	440-470 (134.1-143.3)

*Lithologic description of cuttings (part A) from drill hole USBM-01A,
Horse Draw--Continued*

Description	Depth interval feet (meters)
Tertiary--Continued	
Uinta Formation--Continued	
Same as above, with ~2 percent oil shale-----	470-500 (143.3-152.4)
Siltstone, sandstone, marlstone, and oil shale; siltstone (~50 percent) is pale to dark yellowish brown, very thinly laminated; sandstone (~25 percent) has very fine grains of smoky and clear quartz; marlstone (~25 percent) is pale to dark yellowish brown, very thinly laminated; oil shale (~3-5 percent) is dusky yellowish brown-----	500-515 (152.4-157.0)
Marlstone, sandstone, and oil shale as above; probably no siltstone-----	515-545 (157.0-166.1)
Marlstone, pale- to dark-yellowish-brown; ~1 percent dusky- yellowish-brown oil shale-----	545-575 (166.1-175.3)
Marlstone and oil shale; ~80 percent pale- to dark-yellowish- brown, thinly laminated, marlstone; ~20 percent dusky- yellowish-brown oil shale-----	575-590 (175.3-179.8)
Marlstone, dark-yellowish-brown, and dusky-yellowish-brown oil shale; equal parts-----	590-620 (179.8-189.0)
Similar to above; trace of light-gray to white, very fine grained sandstone-----	620-650 (189.0-198.1)
Marlstone (95 percent), pale- to dark-yellowish-brown, thinly laminated with dusky-yellowish-brown oil shale (5 percent); trace of light-gray to white, very fine grained sandstone-----	650-665 (198.1-202.7)
Marlstone and oil shale, as above; trace of pyrite and rusted fragments (iron mineral, magnetic; may be drill steel)-----	665-680 (202.7-207.3)
Marlstone (75 percent) and oil shale (25 percent); trace of pyrite-----	680-695 (207.3-211.8)
Oil shale (60+ percent), marlstone (35 percent), and siltstone (5 percent); pale-yellowish-brown to light-gray-----	695-710 (211.8-216.4)

Lithologic description of cuttings (part A) from drill hole USBM-01A,
Horse Draw--Continued

Description	Depth interval feet (meters)
Tertiary--Continued	
Uinta Formation--Continued	
Siltstone, pale-yellowish-brown, with tiny streaks of marlstone and oil shale (75 percent); dusky-yellowish-brown oil shale (20 per- cent); pale- to dark-yellowish-brown marlstone (5 percent); thinly laminated units-----	710-720 (216.4-219.5)
Oil shale, dusky-yellowish-brown to black, 95 percent; marlstone and siltstone total 5 percent-----	720-815 (219.5-248.4)
Oil shale, 50 percent; marlstone and siltstone total 50 percent; calcareous-----	815-830 (248.4-253.0)
Bottom of rock-bit zone	

*Lithologic description of core (part B) from drill hole USBM-01A,
Horse Draw*

Description	Depth interval feet (meters)
Tertiary	
Green River Formation	
Parachute Creek Member	
Oil shale, dusky-yellowish-brown, with minor amounts of dark-yellowish-brown oil shale, very thinly laminated; laminations horizontal to as much as 10° at 853-foot (260.0-m) depth; minor thin laminae of marlstone; calcite on open fractures; leached zone at 844 feet (257.3 m), and leached and collapse breccia zone at 855.5 feet (260.8 m)-----	830.0-855.5 (253.0-260.8)
No sample-----	855.5-857.0 (260.8-261.2)
Marlstone, interlaminated with minor siltstone, both pale to dark yellowish brown, very thinly laminated; minor dusky-yellowish-brown fissile oil shale; leaching at 874-876 feet (266.4-267.0 m) and 884-885 feet (269.4-269.7 m); calcite and pyrite on open fractures; laminae horizontal-----	857.0-885.5 (261.2-269.9)
No sample-----	885.5-887.0 (269.9-270.4)
Siltstone, pale-brown and pale-yellowish-brown, predominantly thinly laminated with some thin-bedded intervals-----	887.0-909.0 (270.4-277.1).
Oil shale, dusky-yellowish-brown, fissile; minor amounts of light-gray to pale-brown oil shale; unit contains very thin layers of wavy ash(?) beds; calcite and pyrite on open fractures; unit very brittle, disced, and fractured-----	909.0-912.8 (277.1-278.2)
No sample-----	912.8-915.0 (278.2-278.9)
Oil shale, like unit at 909.0-912.8 feet (277.1-278.2 m)-----	915.0-921.0 (278.9-280.7)
Marlstone, pale- and dark-yellowish-brown; very thinly laminated with minor siltstone and mudstone; calcite on open fractures; collapse breccia at 924 feet (281.6 m)-----	921.0-933.4 (280.7-284.5)
No sample-----	933.4-934.0 (284.5-284.7)

*Lithologic description of core (part B) from drill hole USBM-01A,
Horse Draw--Continued*

Description	Depth interval feet (meters)
Tertiary--Continued	
Green River Formation--Continued	
Parachute Creek Member--Continued	
Oil shale, dusky-yellowish-brown and moderate-brown; thinly laminated with minor dark-yellowish-brown marlstone and siltstone; light-gray ash beds between 935 and 935.5 feet (285.0 and 285.1 m); pyrite in ash beds-----	934.0-946.6 (284.7-288.5)
No sample-----	946.6-948.6 (288.5-289.1)
Oil shale, dusky-yellowish-brown, fissile; some very thin beds of moderate-brown siltstone (ash?) throughout interval; collapse breccia at 956.4-957.4 feet (291.5-291.8 m)-----	948.6-963.8 (289.1-293.8)
No sample-----	963.8-966.0 (293.8-294.4)
Oil shale, dusky- and dark-yellowish-brown, fissile; laminae are horizontal; minor amounts of interlaminated marlstone; thin bed of moderate-yellowish-brown siltstone at 983.5 feet (299.8 m); minor amounts of calcite on fracture surfaces-----	966.0-992.8 (294.4-302.6)
No sample-----	992.8-996.0 (302.6-303.6)
Oil shale, like unit at 966.0-992.8 feet (294.4-302.6 m); collapse breccia at 1,004-1,005 feet (306-306.3 m) and 1,006-1,007 feet (306.6-306.9 m); some vugs in core-----	996.0-1,009.5 (303.6-307.7)
No sample-----	1,009.5-1,012.4 (307.7-308.6)
Oil shale, dusky- to dark-yellowish-brown and brownish-black, like unit at 966.0-992.8 feet (294.4-302.6 m); collapse breccia at 1,012.4-1,020.4 feet (308.6-311.0 m), 1,023-1,026 feet (311.8-312.7 m), and 1,028 feet (313.3 m); minor amounts of pyrite on fractures-----	1,012.4-1,029.3 (308.6-313.7)

*Lithologic description of core (part B) from drill hole USBM-01A,
Horse Draw--Continued*

Description	Depth interval feet (meters)
Tertiary--Continued	
Green River Formation--Continued	
Parachute Creek Member--Continued	
Oil shale and minor mudstone, dusky-yellowish-brown and brownish-black with minor amounts of pale-yellowish-brown fissile oil shale in richer parts; horizontal laminae; minor amounts of calcite on fractures; vuggy and minor collapse breccia at 1,033-1,034.5 feet (314.9-315.3 m) and 1,040-1,041 feet (317.0-317.3 m)-----	1,029.3-1,047.2 (313.7-319.2)
Oil shale interlaminated with siltstone, dusky- and dark-yellowish-brown; fissile oil shale in richer parts; few rounded vugs probably contained nahcolite; collapse breccia (fault zone?) at 1,056-1,060 feet (321.9-323.1 m) contains clay- to cobble sized fragments-----	1,047.2-1,068.8 (319.2-325.8)
No sample-----	1,068.8-1,074.3 (325.8-327.4)
Oil shale, dark-yellowish-brown, very thinly laminated-----	1,074.3-1,078.0 (327.4-328.6)
Siltstone and interlaminated marlstone, pale- to dark-yellowish-brown and moderate-brown; leaching of nahcolite at 1,078-1,080 feet (328.6-329.2 m) and 1,081-1,082 feet (329.5-329.8 m); totally unconsolidated between 1,084.7 and 1,090 feet (330.6 and 332.2 m); B-groove zone-----	1,078.0-1,090.0 (328.6-332.2)
No sample, B-groove zone(?)-----	1,090.0-1,101.5 (332.2-335.7)
Marlstone, dusky- and pale-yellowish-brown, very thinly laminated; calcite on open fractures; small vugs-----	1,101.5-1,104.0 (332.2-336.5)
Siltstone, pale-yellowish-brown, thin-bedded-----	1,104.0-1,106.0 (336.5-337.1)
Oil shale, dusky-yellowish-brown, very thinly laminated; horizontal laminae-----	1,106.0-1,116.5 (337.1-340.3)
Siltstone, like unit at 1,104.0-1,106.0 feet (336.5-337.1 m)-----	1,116.5-1,117.0 (340.3-340.5)

*Lithologic description of core (part B) from drill hole USBM-01A,
Horse Draw--Continued*

Description	Depth interval feet (meters)
Tertiary--Continued	
Green River Formation--Continued	
Parachute Creek Member--Continued	
Oil shale, like unit at 1,106.0-1,116.5 feet (337.1-340.3 m)-----	1,117.0-1,120.7 (340.5-341.6)
Siltstone, like unit at 1,104.0-1,106.0 feet (336.5-337.1 m)-----	1,120.7-1,121.1 (341.6-341.7)
Oil shale, like unit at 1,106.0-1,116.5 feet (337.1-340.3 m)-----	1,121.1-1,122.0 (341.7-342.0)
Marlstone, like unit at 1,101.5-1,104.0 feet (335.8-336.5 m)-----	1,122.0-1,125.9 (342.0-343.2)
No sample-----	1,125.9-1,129.5 (343.2-344.3)
Oil shale, olive-black and dusky-yellowish-brown, with minor yellowish-gray marlstone and siltstone; very thin horizontal laminae; minor scattered vugs as much as 2 inches (5 cm) in diameter which previously contained nahcolite; gilsonite at 1,133 feet (345.3 m) and stringers of oil at 1,136 feet (346.3 m)-----	1,129.5-1,152.5 (344.3-351.3)
No sample-----	1,152.5-1,153.5 (351.3-351.6)
Oil shale, olive-black and dusky-yellowish-brown, with minor amounts of pale-yellowish-brown fissile oil shale-----	1,153.5-1,166.0 (351.6-355.4)
Siltstone, moderate-yellowish-brown-----	1,166.0-1,167.0 (355.4-355.7)
Oil shale, same as unit at 1,153.5-1,166.0 feet (351.6-355.4 m)-----	1,167.0-1,181.5 (355.7-360.1)
Oil shale, olive-black and dusky-yellowish-brown, fissile; minor moderate-yellowish-brown siltstone; collapse breccia at 1,194-1,195 feet (363.9-364.2 m); calcite on open fractures-----	1,181.5-1,194.0 (360.1-363.9)
Marlstone, pale- to dark-yellowish-brown, very thinly laminated-----	1,194.0-1,204.0 (363.9-367.0)
Oil shale, dusky-yellowish-brown, very thinly laminated; thin bed of moderate-yellowish-brown siltstone at 1,217.5 feet (371.1 m); small vugs at 1,218 feet (371.2 m); thin-bedded siltstone at 1,220.0 feet (371.9 m); collapse breccia at 1,220-1,222 feet (371.9-372.5 m)-----	1,222.0-1,233.5 (372.5-376.0)

Lithologic description of core (part B) from drill hole USBM-01A,
Horse Draw--Continued

Description	Depth interval feet (meters)
Tertiary--Continued	
Green River Formation--Continued	
Parachute Creek Member--Continued	
Marlstone, pale-yellowish-brown; very thinly laminated with dark- to dusky-yellowish-brown oil shale-----	1,222.0-1,233.5 (372.5-376.0)
No sample-----	1,233.5-1,240.7 (376.0-378.2)
Oil shale, dusky-yellowish-brown and olive-black; very thinly laminated with minor marlstone; vugs and open joints at 1,248 feet (380.4 m)-----	1,240.7-1,255.0 (378.2-382.5)
No sample-----	1,255.0-1,261.1 (382.5-384.4)
Oil shale, pale- to moderate-yellowish-brown; very thinly laminated to thin bedded with some dusky-yellowish-brown oil shale; evidence of leaching, minor calcite on fracture surfaces-----	1,261.1-1,287.1 (384.4-392.3)
Siltstone, yellowish-gray with minor dusky-yellow, very thinly laminated; laminae generally horizontal; inter- laminated with dusky-yellowish-brown oil shale which becomes more prominent in lower 4 feet (1.2 m)-----	1,287.1-1,300.0 (392.3-396.2)
Siltstone, pale-yellowish-brown, thinly laminated; laminae are horizontal; leached zones from 1,300.3 to 1,303.3 (396.3 to 397.2 m); vugs as much as 1/4 inch in diameter at 1,312 feet (399.9 m)-----	1,300.0-1,315.0 (396.2-400.8)
Siltstone, light-olive-gray and olive-black, very finely laminated; laminae are horizontal; leached zone from 1,317.5 to 1,317.7 feet (401.6 to 401.7 m)-----	1,315.0-1,318.7 (400.8-401.9)
Siltstone, yellowish-gray and medium-gray, thinly laminated to thin-bedded; horizontal laminae and beds; leached zone from 1,318.7 to 1,327.9 feet (401.9 to 404.7 m); pinhead- sized vugs contain traces of calcite-----	1,318.7-1,331.7 (401.9-405.9)
Oil shale, dusky-yellow; thinly laminated with minor amounts of silty inclusions-----	1,331.7-1,332.4 (405.9-406.1)

*Lithologic description of core (part B) from drill hole USBM-01A,
Horse Draw--Continued*

Interval feet (meters)	Description	Depth interval feet (meters)
Tertiary--Continued		
Green River Formation--Continued		
Parachute Creek Member--Continued		
0-1,233.5 5-376.0)	No sample-----	1,332.4-1,335.2 (406.1-407.0)
5-1,240.7 0-378.2)	Marlstone, olive-gray, thinly laminated, horizontal laminations-----	1,335.2-1,337.4 (407.0-407.6)
7-1,255.0 2-382.5)	Siltstone, pale- and dark-yellowish-brown; horizontal to subhorizontal bedding; minor amounts of laminated oil shale; calcite on fracture surfaces-----	1,337.4-1,341.2 (407.6-408.8)
0-1,261.1 5-384.4)	Siltstone, dark-yellowish-brown, calcitic, leached; hori- zontal bedding-----	1,341.2-1,347.4 (408.8-410.7)
-1,287.1 -392.3)	Siltstone, pale-yellowish-brown, with minor amounts of light-olive-gray and dusky-yellowish-brown laminated oil shale; bedding horizontal to subhorizontal-----	1,347.4-1,352.2 (410.7-412.2)
	Clay, dark-yellowish-brown-----	1,352.2-1,353.2 (412.2-412.5)
-1,300.0 -396.2)	Siltstone, shattered-----	1,353.2-1,353.6 (412.5-412.7)
	No sample-----	1,353.6-1,354.6 (412.7-412.9)
1,315.0 400.8)	Oil shale, dusky-yellowish-brown, very thinly laminated with minor amounts of dark-yellowish-brown oil shale; siltstone layer at 1,359 feet (414.2 m); collapse breccia between 1,354.6 and 1,359.5 feet (412.9 and 414.4 m); leached at 1,361.3-1,361.6 feet (414.9- 415.0 m); vugs as much as 3 inches (7.6 cm) wide throughout core-----	1,354.6-1,361.6 (412.9-415.0)
1,318.7 401.9)	No sample-----	1,361.6-1,370.3 (415.0-417.7)
1,331.7 405.9)	Oil shale, pale-yellowish-brown, yellowish-gray, and light- olive-gray, thinly laminated to thin-bedded; pods contain- ing clay and calcite with minor amounts of pyrite at 1,400- 1,420 feet (426.7-432.8 m); unit contains thin to thick beds of pale-yellowish-brown translucent nahcolite, disseminated nahcolite, and scattered rosettes of nahcolite as much as 4 inches (10.2 cm) in diameter-----	1,370.3-1,420.0 (417.7-432.8)

*Lithologic description of core (part B) from drill hole USBM-01A,
Horse Draw--Continued*

Description	Depth interval feet (meters)
Tertiary--Continued	
Green River Formation--Continued	
Parachute Creek Member--Continued	
Nahcolite, very light gray to pale-yellowish-brown, translucent, thin-bedded-----	1,420.0-1,422.0 (432.8-433.4)
Oil shale, pale-yellowish-brown, dusky-yellowish-brown, and dusky-brown, thinly laminated; rosettes of nahcolite as much as 4 inches (10.2 cm) in diameter throughout interval; unit is grayish black between 1,429.4 and 1,436.2 feet (435.7-437.8 m)-----	1,422.0-1,437.3 (433.4-438.1)
Nahcolite, moderate-yellowish-brown, coarsely crystalline, bedded; contains rosettes at 1,438.8-1,439.2 feet (438.5-438.7 m)-----	1,437.3-1,440.2 (438.1-439.0)
Halite, white to dusky-yellowish-brown, coarsely crystalline; minor thin beds of moderate-yellowish-brown oil shale-----	1,440.2-1,443.4 (439.0-439.9)
Oil shale, dark-yellowish-brown and dusky-yellow, thinly laminated; most laminae horizontal; thin nahcolite beds and rosettes scattered throughout unit-----	1,443.4-1,473.2 (439.4-449.0)
Halite, moderate-brown to dusky-brown, transparent to translucent, coarsely crystalline; minor amounts of nahcolite-----	1,473.2-1,477.5 (449.0-450.3)
Oil shale, dusky-yellow, very thinly laminated, interlayered with nahcolite rosettes-----	1,477.5-1,487.9 (450.3-453.5)
No sample-----	1,487.9-1,488.9 (453.5-453.8)
Oil shale, olive-gray and dusky-yellowish-brown, fissile in part; laminae are horizontal; interlaminated and bedded with moderate-brown, transparent crystalline nahcolite-----	1,488.9-1,504.0 (453.8-458.4)
Oil shale, as above; nahcolite rosettes scattered throughout unit-----	1,504.0-1,522.0 (458.4-463.9)

*Lithologic description of core (part B) from drill hole USBM-01A,
Horse Draw--Continued*

Interval feet (meters)	Description	Depth interval feet (meters)
	Tertiary--Continued	
	Green River Formation--Continued	
	Parachute Creek Member--Continued	
0.0-1,422.0 8-433.4)	Nahcolite, dark-yellowish-brown, translucent to transparent, crystalline; interlaminated with oil shale-----	1,522.0-1,531.0 (463.9-466.6)
	Nahcolite, moderate-brown; crystalline rosettes as much as 5 inches (12.4 cm) in diameter interlayered with olive- black and dusky-yellowish-brown oil shale-----	1,531.0-1,577.4 (466.6-480.8)
0.0-1,437.3 4-438.1)	No sample-----	1,577.4-1,578.4 (480.8-481.1)
	Oil shale, dusky-yellowish-brown and olive-black; contains scattered rosettes and thin beds of nahcolite-----	1,578.4-1,589.6 (481.1-484.5)
3-1,440.2 1-439.0)	Oil shale, as above; contains thin beds of crystalline nahcolite as much as 2.4 feet (0.7 m) thick-----	1,589.6-1,633.0 (484.5-497.7)
2-1,443.4 0-439.9)	Halite, olive-black, coarsely crystalline; interbedded with oil shale-----	1,633.0-1,635.3 (497.7-498.4)
4-1,473.2 4-449.0)	Oil shale, dusky-yellowish-brown and grayish-brown, fissile and thinly laminated; white to dark-yellowish-brown crys- talline nahcolite in beds and rosettes scattered through- out unit; minor amounts of white to medium-light-gray crystalline halite-----	1,635.3-1,682.8 (498.4-512.9)
2-1,477.5 0-450.3)	No sample-----	1,682.8-1,698.6 (512.9-517.7)
5-1,487.9 3-453.5)	Nahcolite, moderate-brown, finely crystalline, thin-bedded-----	1,698.6-1,704.0 (517.7-519.4)
9-1,488.9 5-453.8)	Halite, white to dark-gray, fine to coarsely crystalline; interbedded and laminated with dusky-yellow, finely crystalline nahcolite-----	1,704.0-1,719.0 (519.4-524.0)
9-1,504.0 8-458.4)	Nahcolite, like unit at 1,698.6-1,704.0 feet (517.7-519.4 m)-----	1,719.0-1,722.0 (524.0-524.9)
0-1,522.0 4-463.9)	Halite and nahcolite, like unit at 1,704.0-1,719.0 feet (519.4-524.0 m)-----	1,722.0-1,729.0 (524.9-527.0)

*Lithologic description of core (part B) from drill hole USBM-01A,
Horse Draw--Continued*

Description	Depth interval feet (meters)
Tertiary--Continued	
Green River Formation--Continued	
Parachute Creek Member--Continued	
Oil shale, black and dark-yellowish-brown to 1,732.0 feet (527.9 m), and dark- to dusky-yellowish-brown oil shale below 1,732.0 feet (527.9 m); minor amounts of dark-yellowish-brown, bedded, crystalline nahcolite and nahcolite rosettes as much as 2 inches (5 cm) in diameter; trace of pyrite-----	1,729.0-1,757.8 (527.0-535.8)
No sample-----	1,757.8-1,758.0 (535.8-535.8+)
Nahcolite, pale-brown, laminated to thin-bedded, opaque to translucent, crystalline-----	1,758.0-1,760.0 (535.8+-536.4)
Oil shale, dusky-yellowish-brown and pale-brown, fissile; contains nahcolite rosettes as much as 5 inches (12.7 cm) in diameter-----	1,760.0-1,786.0 (536.4-544.4)
Nahcolite, like unit at 1,758.0-1,760.0 feet (535.8-536.4 m)-----	1,768.0-1,790.0 (544.4-545.6)
Oil shale, like unit at 1,760.0-1,786.0 feet (536.4-544.4 m)-----	1,790.0-1,791.0 (545.6-545.9)
Nahcolite, like unit at 1,758.0-1,760.0 feet (535.8+-536.4 m)-----	1,791.0-1,795.0 (545.9-547.1)
Oil shale, like unit at 1,760.0-1,786.0 feet (536.4-544.4 m)-----	1,795.0-1,804.0 (547.1-549.9)
Nahcolite, Like unit at 1,758.0-1,760.0 feet (535.8+-536.4 m)-----	1,804.0-1,814.0 (549.9-552.9)
Oil shale, like unit at 1,760.0-1,786.0 feet (536.4-544.4 m)-----	1,814.0-1,816.5 (552.9-553.7)
No sample-----	1,816.5-1,818.3 (553.7-554.2)
Nahcolite, pale-brown to pale-yellowish-brown, laminated to thin-bedded, opaque to transparent, crystalline-----	1,818.3-1,832.0 (554.2-558.4)
Oil shale, olive-gray and dusky-yellowish-brown, fissile; minor amounts of grayish-olive oil shale; abundant moderate-brown nahcolite rosettes as wide as 6 inches (15.2 cm)-----	1,832.0-1,839.0 (558.4-560.5)

Lithologic description of core (part B) from drill hole USBM-01A,
Horse Draw--Continued

Depth interval feet (meters)	Description	Depth interval feet (meters)
Tertiary--Continued		
Green River Formation--Continued		
Parachute Creek Member--Continued		
1,729.0-1,757.8 527.0-535.8)	Nahcolite, like unit at 1,818.3-1,832.0 feet (554.2-558.4 m)-----	1,839.0-1,848.0 (560.5-563.3)
1,757.8-1,758.0 535.8-535.8+)	Oil shale, like unit at 1,832.0-1,839.0 feet (558.4-560.5 m)-----	1,848.0-1,852.0 (563.3-564.5)
1,758.0-1,760.0 535.8-536.4)	Nahcolite, like unit at 1,818.3-1,832.0 feet (554.2-558.4 m)-----	1,852.0-1,857.0 (564.5-566.0)
1,760.0-1,786.0 536.4-544.4)	Oil shale, like unit at 1,832.0-1,839.0 feet (558.4-560.5 m)-----	1,857.0-1,860.0 (566.0-566.9)
1,768.0-1,790.0 544.4-545.6)	Nahcolite, like unit at 1,818.3-1,832.0 feet (554.2-558.4 m)-----	1,860.0-1,861.0 (566.9-567.2)
1,790.0-1,791.0 545.6-545.9)	Oil shale, like unit at 1,832.0-1,839.0 feet (558.4-560.5 m)-----	1,861.0-1,866.0 (567.2-568.8)
1,791.0-1,795.0 545.9-547.1)	Nahcolite, like unit at 1,818.3-1,832.0 feet (554.2-558.4)-----	1,866.0-1,867.0 (568.8-569.1)
1,795.0-1,804.0 547.1-549.9)	Oil shale, like unit at 1,832.0-1,839.0 feet (558.4-560.5 m)-----	1,867.0-1,877.2 (569.1-572.2)
1,804.0-1,814.0 549.9-552.9)	Nahcolite, pale-yellowish-brown, opaque, crystalline-----	1,877.2-1,879.0 (572.2-572.7)
1,814.0-1,816.5 552.9-553.7)	Oil shale, dark-yellowish-brown, fissile; minor amounts of dusky-yellowish-brown and pale-yellowish-brown oil shale below 1,907.8 feet (581.5 m); some stringers of dusky- brown oil shale above 1,907.8 feet (581.5 m); interval contains moderate-brown nahcolite rosettes as large as 18 inches (46 cm) in diameter-----	1,879.0-1,914.7 (572.7-583.6)
1,816.5-1,818.3 553.7-554.2)	Nahcolite, like unit at 1,877.2-1,879.0 feet (572.2-572.7 m)-----	1,914.7-1,915.7 (583.6-583.9)
1,818.3-1,832.0 554.2-558.4)	Oil shale, like unit at 1,879.0-1,914.7 feet (572.7-583.6 m); rosettes as much as 12 inches (31 cm) in diameter-----	1,915.7-1,930.4 (583.9-588.4)
1,832.0-1,839.0 558.4-560.5)	No sample-----	1,930.4-1,934.5 (588.4-589.6)
	Oil shale, olive-gray and dark-yellowish-brown, thinly laminated to thinly bedded; laminae and beds horizontal; occasional blebby and streaked structure; scattered rosettes of moderate-brown to grayish-black nahcolite as much as 5 inches (12.7 cm) in diameter-----	1,934.5-1,939.6 (589.6-591.2)

Lithologic description of core (part B) from drill hole USBM-01A,
Horse Draw--Continued

Description	Depth interval feet (meters)
Tertiary--Continued	
Green River Formation--Continued	
Parachute Creek Member--Continued	
Nahcolite, moderate-brown to grayish-black, bedded, fine to medium crystalline-----	1,939.6-1,941.7 (591.2-591.8)
Oil shale, like unit at 1,934.5-1,939.6 feet (589.6-591.2 m)-----	1,941.7-1,947.0 (591.8-593.4)
Nahcolite, like unit at 1,939.6-1,941.7 feet (591.2-591.8 m)-----	1,947.0-1,947.7 (593.4-593.7)
Oil shale, like unit at 1,934.5-1,939.6 feet (589.6-591.2 m)-----	1,947.7-1,988.0 (593.7-605.9)
Nahcolite, dark-yellowish-brown, bedded and rosette, coarsely crystalline-----	1,988.0-2,023.0 (605.9-616.6)
Oil shale, olive-gray to dusky-yellow and grayish-black, thinly laminated; streaked and blebby structure at 2,002, 2,007, and 2,036 feet (610.2, 611.7, and 620.6 m); clay zone (fault) at 2,048.3 feet (624.3 m)-----	2,023.0-2,048.3 (616.6-624.3)
Oil shale, pale-yellowish-brown, with thin beds of dusky-yellowish-brown and olive-black oil shale, thinly laminated; horizontal laminae; scattered transparent moderate-brown rosettes of nahcolite as much as 6 inches (15 cm) in diameter-----	2,048.3-2,067.0 (624.3-630.0)
Oil shale, as above; unit contains beds of pale-yellowish-brown opaque crystalline nahcolite-----	2,067.0-2,086.0 (630.0-635.8)
Oil shale, olive-gray to dark-yellowish-brown, fissile; numerous beds of finely crystalline, and rosettes of coarsely crystalline, grayish-brown to moderate-yellowish-brown nahcolite; beds range to as much as 1 foot (30 cm) thick, and rosettes to 6 inches (15 cm); pyrite throughout unit-----	2,086.0-2,156.0 (635.8-657.1)
Nahcolite, grayish-brown to moderate-yellowish-brown, bedded; stringers of oil shale-----	2,156.0-2,163.5 (657.1-659.4)

*Lithologic description of core (part B) from drill hole USBM-01A,
Horse Draw--Continued*

Depth interval feet (meters)	Description	Depth interval feet (meters)
	Tertiary--Continued	
	Green River Formation--Continued	
	Parachute Creek Member--Continued	
939.6-1,941.7 591.2-591.8)	Oil shale and nahcolite, like unit at 2,086.0-2,156.0 feet (635.8-657.1 m)-----	2,163.5-2,167.9 (659.4-660.8)
41.7-1,947.0 91.8-593.4)	No sample-----	2,167.9-2,168.8 (660.8-661.1)
47.0-1,947.7 93.4-593.7)	Oil shale, olive-gray to grayish-brown, fissile to thinly laminated; grades downward into olive-black oil shale; streaked and blebby structure from 2,178.0 to 2,187.0 feet (663.9-666.6 m); unit contains scattered beds and rosettes of nahcolite and a 0.1-foot- (3-cm-) thick bed of halite at 2,185.0 feet (666.0 m)-----	2,168.8-2,224.0 (661.1-677.9)
8.0-2,023.0 5.9-616.6)	Nahcolite, moderate-brown, platy; transparent crystals, beds and rosettes-----	2,224.0-2,239.0 (677.9-682.4)
3.0-2,048.3 5.6-624.3)	Oil shale, dusky-yellow-brown and olive-black, alternating with laminae of moderate- and pale-yellowish-brown oil shale, fissile, thin-bedded; laminae generally horizontal-- those at 2,255 feet (687.3 m) dip as much as 10°; unit contains blebs and stringers of pale-yellowish-brown oil shale; scattered rosettes of nahcolite 6-7 inches (15-18 cm) in diameter-----	2,239.0-2,260.0 (682.4-688.8)
3-2,067.0 3-630.0)	Oil shale, dusky-yellowish-brown, with stringers and blebs of pale-yellowish-brown oil shale; unit contains minor amounts of disseminated nahcolite-----	2,260.0-2,289.0 (688.8-697.7)
0-2,086.0 0-635.8)	Oil shale, olive-gray, alternating with grayish-brown and dusky-brown oil shale; a few black laminae of oil shale; blebs of thinly laminated dusky-yellow oil shale between 2,316 and 2,318 feet (705.9 and 706.5 m); irregular clast- like structures of dusky-yellowish-brown oil shale cut across and slightly disrupt laminations; blue marker at 2,322 feet (707.7 m)-----	2,289.0-2,322.0 (697.7-707.7)

Lithologic description of core (part B) from drill hole USBM-01A,
Horse Draw--Continued

Description	Depth interval feet (meters)
Tertiary--Continued	
Green River Formation--Continued	
Garden Gulch Member	
Oil shale, olive-gray, grayish-brown, and dusky-brown, inter- laminated with medium-dark-gray to dark-gray shale; shale is brittle and massive; stringers of sandy limestone at 2,333.1 feet (711.1 m), and limestone at 2,332.6 feet (711.0 m) and 2,334.2 feet (711.5 m)-----	2,322.0-2,334.2 (707.7-711.5)
Oil shale, olive-gray, grayish-brown, and dusky-brown, thinly laminated-----	2,334.2-2,335.8 (711.5-712.0)
No sample-----	2,335.8-2,339.8 (712.0-713.2)
Oil shale, dark- and dusky-yellowish-brown, in thin to thick laminations; below 2,347 feet (715.4 m) rock is light yellowish brown; siltstone laminae at 2,345.2 feet (714.8 m) and 2,346.7 feet (715.3 m); thinly laminated blebs of dusky-yellowish-brown oil shale between 2,339.8 and 2,345 feet (713.2 and 714.8 m)-----	2,339.8-2,354.3 (713.2-717.6)
No sample-----	2,354.3-2,386.7 (717.6-727.5)
Oil shale, light-olive-gray and grayish-black, fissile to thin- bedded, brittle, in alternating thin laminae with minor amounts of olive-black oil shale-----	2,386.7-2,405.7 (727.5-733.3)
No sample-----	2,405.7-2,406.9 (733.3-733.6)
Shale, grayish-black, interlaminated with dusky-yellowish- brown oil shale; blebs of rich oil shale at 2,413.0-2,413.4 feet (735.5-735.6 m); thin silty layers at 2,415.5 and 2,423.6 feet (736.2 and 738.7 m); rock shatters and discs easily; waxy surfaces on disc faces-----	2,406.9-2,426.5 (733.6-739.6)
No sample-----	2,426.5-2,436.2 (739.6-742.6)
Shale, olive-black, interlaminated with light-olive-brown oil shale; horizontal laminations; core discs and shatters easily; waxy surfaces on disc faces-----	2,436.2-2,444.0 (742.6-744.9)

Lithologic description of core (part B) from drill hole USBM-01A,
Horse Draw--Continued

Description	Depth interval feet (meters)
Tertiary--Continued	
Green River Formation--Continued	
Garden Gulch Member--Continued	
Oil shale, dusky-yellowish-brown, with slightly darker stringers-----	2,444.0-2,460.0 (744.9-749.8)
Shale, olive-black, olive-gray, and dusky-yellowish-brown; dusky-gray laminated shale at 2,468-2,482 feet (752.2- 756.5 m)-----	2,460.0-2,484.5 (749.8-757.3)
No sample-----	2,484.5-2,487.5 (757.3-758.2)
Shale, light-olive-gray, laminated with dark-gray to olive-gray shale; horizontal laminations; some laminae of dusky-yellow oil shale; core discs along waxy-coated laminae; calcareous to slightly calcareous from 2,491.0 to 2,502.0 feet (759.3 to 762.6 m)-----	2,487.5-2,539.6 (758.2-774.1)
No sample-----	2,539.6-2,547.6 (774.1-776.5)
Total depth of core-----	2,547.6 (776.5)
Total depth for hole-----	2,610.0 (795.5)

Table 3.--Lithologic description, drill hole USBM-01A

Cuttings description	Interval thickness ft (m)
Horse Draw:	
Piceance Creek Basin:	
Cuttings	
Siltstone, dusky-yellowish-brown (wet); grains mostly smoky quartz, trace clear quartz and tiny pyrite; no calcareous cement-----	210-225 (64.0-68.6)
Siltstone, as above, with trace of magnetite-----	225-240 (68.6-73.2)
Siltstone, as above, with more magnetite and pyrite which is clumps of tiny crystals; trace of laminated siltstone and oil shale, very thin laminae-----	240-255 (73.2-77.7)
Same as above; no laminated material-----	255-270 (77.7-82.3)
Siltstone as above; trace of very fine-grained quartzitic sandstone, smoky quartz grains. No laminated material-----	270-295 (82.3-89.9)
Same as above; trace of oil shale as <1 mm frag- ments; trace of siltstone with calcite cement, subangular smoky quartz and trace of clear quartz grains-----	295-310 (89.9-94.5)

Table 3.--Lithologic description, drill hole USBM-01A--Continued

Cuttings description	Interval thickness ft (m)
Horse Draw--Continued	
Piceance Creek Basin--Continued	
Cuttings--Continued	
Siltstone and very fine-grained sandstone; siltstone as above; sandstone quartzitic with no calcareous cement. Trace of pyrite magne- tite and very thin laminae or lenses of oil shale. Color (wet) darkening from dark- yellowish-brown to dusky-yellowish-brown-----	310-365 (94.5-111.3)
Marlstone, very thinly laminated, pale-yellowish- brown and dark-yellowish-brown (wet); siltstone light-gray to pale-yellowish-brown; minor amount of very fine-grained sandstone of quartz grains, no calcareous cement. Cuttings very fine-----	365-380 (111.3-115.8)
Marlstone as above; trace of siltstone, no sandstone-----	380-425 (115.8-129.5)
Missing-----	425-440 (129.5-134.1)
Marlstone, as above, 95 percent; oil shale dusky- yellowish-brown, 5 percent; trace pyrite-----	440-470 (134.1-143.3)

Table 3.--Lithologic description, drill hole USBM-01A--Continued

Cuttings description	Interval thickness ft (m)
Horse Draw--Continued	
Piceance Creek Basin--Continued	
Cuttings--Continued	
As above, with ~2 percent oil shale-----	470-500 (143.3-152.4)
Siltstone, pale- to dark-yellowish-brown, very thinly laminated ~50 percent; sandstone, quartz grains smoky and clear, very fine grained ~25 percent; marlstone, pale- to dark-yellowish- brown ~25 percent, and very thinly laminated; oil shale ~3-5 percent, dusky-yellowish-brown--	500-515 (152.4-157.0)
Marlstone, sandstone and oil shale as above; probably no siltstone-----	515-545 (157.0-166.1)
Marlstone, pale- to dark-yellowish-brown; ~1 percent oil shale dusky-yellowish-brown----	545-575 (166.1-175.3)
Marlstone, pale- to dark-yellowish-brown, thinly laminated, with dusky-yellowish-brown oil shale; marlstone ~80 percent, oil shale ~20 percent. Bigger cuttings ~1 mm than above 15 ft interval-----	575-590 (175.3-179.8)

Table 3.--Lithologic description, drill hole USBM-01A--Continued

Cuttings description	Interval thickness ft (m)
Horse Draw--Continued	
Piceance Creek Basin--Continued	
Cuttings--Continued	
Equal parts dark-yellowish-brown marlstone and dusky-yellowish-brown oil shale, some reaction to HCl above what has been noted previously, probably small amount of calcite-----	590-620 (179.8-189.0)
Similar to above, but no calcareous reaction past dust particles reacting to HCl; trace of light- gray to white very fine-grained sandstone-----	620-650 (189.0-198.1)
Marlstone, pale- to dark-yellowish-brown, 95 percent, thinly laminated with oil shale dusky-yellowish-brown 5 percent; trace of light-gray to white very fine-grained sand- stone-----	650-665 (198.1-202.7)
Marlstone and oil shale as above; trace of pyrite and rusted fragments (iron mineral magnetic, may be drill steel)-----	665-680 (202.7-207.3)
Marlstone 75 percent, oil shale 25 percent; trace of pyrite-----	680-695 (207.3-211.8)

Table 3.--Lithologic description, drill hole USBM-01A--Continued

Cuttings description	Interval thickness ft (m)
Horse Draw--Continued	
Piceance Creek Basin--Continued	
Cuttings--Continued	
Oil shale 60+ percent, marlstone 35 percent, siltstone 5 percent, pale-yellowish-brown to light-gray, slight reaction to HCl-----	695-710 (211.8-216.4)
Siltstone, pale-yellowish-brown with tiny streaks of marlstone and oil shale 75 percent; oil shale dusky-yellowish-brown 20 percent; marlstone pale- to dark-yellowish-brown 5 per- cent, thinly laminated units-----	710-725 (216.4-221.0)
Oil shale, dusky-yellowish-brown to black 95 percent, marlstone and siltstone total 5 per- cent; marked reaction to HCl. Large cuttings 2-4 mm-----	725-815 (221.0-248.4)
Fifty percent oil shale, 50 percent marlstone and siltstone, calcareous-----	815-830 (248.4-253.0)
	End of cuttings

~~Table 3~~ -- *lithologic description of core from USBM-01A distal (core)*
~~Table 3~~ -- ~~Depth to bottom of unit (feet)~~ *description*

	Core Description	Depth to bottom of unit (feet)
25.5'	Oil shale, dusky-yellowish-brown with minor amounts of dark-yellowish-brown, very thinly laminated, laminations horizontal to as much as 10° at (260.0) 853-foot depth. Minor thin laminae of marlstone. Calcite on open fractures, leached zone at 844 ft _Λ (257.3) and leached and collapse breccia zone at 855.5 ft _Λ (260.8)	253.0 - 260.8 830.0-855.5
1.5'	No recovery-----	855.5-857.0 260.8 - 261.2
28.5'	Marlstone, interlaminated with minor siltstone, both pale- to dark-yellowish-brown, very thinly laminated. Minor dusky-yellowish-brown fissile oil shale. Leaching at (266.4-267.7) (269.4-269.7) 874-876 ft _Λ and 884-885 ft _Λ Calcite and pyrite on open fractures. Laminae horizontal-----	261.2 - 267.9 857.0-885.5 269.9 - 270.4
1 1/2'	No recovery-----	885.5-887.0
24'	Siltstone, pale-brown and pale-yellowish-brown, predominantly thinly laminated with some thin bedded-----	270.4 - 272.1 887.0-909.0
1.94'	Oil shale, dusky-yellowish-brown, fissile, minor amounts of light gray to pale brown. Unit contains very thin layers of wavy ash(?) beds. Calcite and pyrite on open fractures. Unit very brittle, disced and fractures-----	277.1 - 278.2 909.0-912.8
2.2'	No recovery-----	278.2 - 278.9 912.8-915.0
6'	Oil shale, like unit at 909.0-912.8 ft _Λ (277.1-278.2)	278.9 - 280.7 915.0-921.0
12.4'	Marlstone, pale- and dark-yellowish-brown, very thinly laminated with minor siltstone and mudstone. Calcite (281.6) on open fractures, collapse breccia at 924 ft _Λ -----	280.7 - 284.5 921.0-933.4

Description	Depth to bottom of unit (feet)
No recovery-----	284.5-284.7 933.4-934.0
Oil shale, dusky-yellowish-brown and moderate brown, thinly laminated with minor dark-yellowish-brown marlstone and siltstone. Light-gray ash beds between 935 and 935.5 (285.1) ft, pyrite in ash beds-----	284.7-288.5 934.0-946.6
No recovery-----	288.5-289.1 946.6-948.6
Oil shale, dusky-yellowish-brown, fissile. Some very thin beds of moderate brown siltstone (ash?) throughout interval. Collapse breccia at 956.4-957.4 ft-----	289.1-291.8 948.6-963.8
No recovery-----	293.8-294.4 963.8-966.0
Oil shale, dusky- and dark-yellowish-brown, fissile, laminae are horizontal. Minor amounts of inter- laminated marlstone. Thin bed of moderate yellowish- brown siltstone at 983.5 ft. Minor amounts of calcite on fracture surfaces-----	294.4-302.6 966.0-992.8
No recovery-----	302.6-303.6 992.8-996.0
Oil shale, like unit at 963.8-966.0 ft. Collapse breccia at 1,004-1,005 ft and 1,006-1,007 ft. Some vugs in core-----	303.6-307.7 996.0-1,009.5
No recovery-----	307.7-308.6 1,009.5-1,012.4
Oil shale, like unit at 963.8-966.0 ft. Oil shale dusky- to dark-yellowish-brown and brownish-black. Collapse breccia at 1,010.5-1,020.4, 1,023-1,026 and 1,028 ft, Minor amounts of pyrite on fractures-----	308.6-313.7 1,012.4-1,029.3

Description	Depth to bottom of unit (feet)
Oil shale and minor mudstone, dusky-yellowish-brown and brownish-black with minor amounts of pale-yellowish-brown fissile in richer parts, horizontal laminae, minor amounts of calcite on fractures. Vuggy and minor collapse breccia at 1,033-1,034.5 and 1,040-1,041 ft-----	314.9 - 315.3 317 - 317.3 313.7 - 319.2 1,029.3-1,047.2
Oil shale interlaminated with siltstone, dusky- and dark-yellowish-brown; oil shale fissile in richer parts. Few rounded vugs probably contained nahcolite. Collapse breccia (fault zone?) at 1,056-1,060 ft containing clay- to cobble-sized fragments-----	321.9 - 323.1 319.2 - 325.8 1,047.2-1,068.8
No recovery-----	325.8 - 327.4 1,068.8-1,074.3
Oil shale, dark-yellowish-brown, very thinly laminated-----	327.4 - 328.6 1,074.3-1,078.0
Siltstone and interlaminated marlstone, pale- to dark-yellowish-brown and moderate brown. Leaching of nahcolite at 1,078-1,080 ft and 1,081-1,082 ft. Totally unconsolidated between 1,084.7 and 1,090 ft.	328.6 - 329.2 329.5 - 329.8 330.6 330.2
B-groove zone-----	328.6 - 332.2 1,078.0-1,090.0
No recovery, B-groove zone-----	335.7 1,090.0-1,101.5
Marlstone, dusky- and pale-yellowish-brown, very thinly laminated, calcite on open fractures, small vugs-----	332.2 - 336.5 1,101.5-1,104.0
Siltstone, pale-yellowish-brown, thin bedded-----	336.5 - 337.1 1,104.0-1,106.0

Description	Depth to bottom of unit (feet)
Oil shale, dusky-yellowish-brown, very thinly laminated, horizontal laminae-----	337.1 - 340.3 1,106.0-1,116.5
Siltstone, like unit at 1,104.0-1,106.0 ft-----	336.5 - 337.1 340.3 - 340.5 1,116.5-1,117.0
Oil shale, like unit at 1,106.0-1,116.5 ft-----	337.1 - 340.5 340.5 - 341.6 1,117.0-1,120.7
Siltstone, like unit at 1,104.0-1,106.0 ft-----	336.5 - 337.1 341.6 - 341.7 1,120.7-1,121.1
Oil shale, like unit at 1,106.0-1,116.5 ft-----	337.1 - 340.5 341.7 - 342.0 1,121.1-1,122.0
Marlstone, like unit at 1,101.5-1,104.0 ft-----	335.7 - 340.5 342.0 - 343.2 1,122.0-1,125.9
No recovery-----	343.2 - 344.3 1,125.9-1,129.5
Oil shale, olive-black and dusky-yellowish-brown, with minor yellowish-gray marlstone and siltstone, very thin horizontal laminae. Minor scattered vugs up to 2 inches in diameter which previously contained nahcolite. Gilsonite at 1,133 ft and stringers of oil at 1,136 ft-----	345.3 346.3 344.3 - 351.3 1,129.5-1,152.5
No recovery-----	351.3 - 351.6 1,152.5-1,153.5
Oil shale, olive-black and dusky-yellowish-brown with minor amounts of pale-yellowish-brown, fissile-----	351.6 - 355.4 1,153.5-1,166.0
Siltstone, moderate-yellowish-brown-----	355.4 - 355.7 1,166.0-1,167.0
Oil shale, same as unit at 1,153.5-1,166.0 ft-----	351.6 - 355.4 355.7 - 360.1 1,167.0-1,181.5
Oil shale, olive-black and dusky-yellowish-brown, fissile. Minor moderate-yellowish-brown siltstone. Collapse breccia at 1,194-1,195 ft. Calcite on open fractures---	363.9 - 364.2 360.1 - 363.9 1,181.5-1,194.0

Description	Depth to bottom of unit (feet)
Marlstone, pale- to dark-yellowish-brown, very thinly	
laminated-----	363.9 - 367.0 1,194.0-1,204.0
Oil shale, dusky-yellowish-brown, very thinly laminated.	
Thin bed of moderate-yellowish-brown siltstone at	
371.1 371.2 1,217.5 ft. Small vugs at 1,218 ft-----	367.0 - 372.5 1,204.0-1,222.0
Marlstone, pale-yellowish-brown, very thinly laminated	
with dark- to dusky-yellowish-brown oil shale. Thin	
371.9 bedded siltstone at 1,220.0 ft. Collapse breccia at	
371.9 - 372.8 1,220-1,223 ft-----	372.5 - 376.0 1,222.0-1,233.5
No recovery-----	376.0 - 378.2 1,233.5-1,240.7
Oil shale, dusky-yellowish-brown and olive-black, very	
thinly laminated with minor marlstone. Vugs and open	
380.4 joints at 1,248 ft-----	378.2 - 382.5 1,240.7-1,255.0
No recovery-----	382.5 - 384.4 1,255.0-1,261.1
Oil shale, pale- to moderate-yellowish-brown, very thinly	
laminated to thin bedded with some dusky-yellowish-	
brown oil shale. Evidence of leaching, minor calcite	
on fracture surfaces-----	384.4 - 392.3 1,261.1-1,287.1
Siltstone, yellowish-gray with minor dusky-yellow, very	
thinly laminated, laminae generally horizontal. Inter-	
laminated with dusky-yellowish-brown oil shale which	
1.2 becomes more prominent in lower 4 ft-----	392.3 - 396.2 1,287.1-1,300.0

Description	Depth to bottom of unit (feet)
Clay, dark-yellowish-brown-----	412.2 - 412.5 1,352.2-1,353.2
Siltstone, shattered-----	412.5 - 412.7 1,353.2-1,353.6
No recovery-----	412.7 - 412.9 1,353.6-1,354.6
Oil shale, dusky-yellowish-brown very thinly laminated with minor amounts of dark-yellowish-brown. Siltstone layer at 1,359 ft. Collapse breccia between 1,354.6 and 1,359.5 ft. Leached at 1,361.3-1,363.3 ft. Vugs up to 3 inches throughout core-----	(414.2) (412.9) (414.4) (414.9 - 415.0) (7.6 cm) 1.6 412.9 - 415.0 1,354.6-1,361.6
No recovery-----	415.0 - 417.7 1,361.6-1,370.3
Oil shale, pale-yellowish-brown, yellowish-gray and light- olive-gray, thinly laminated to thin bedded. Pods con- taining clay and calcite with minor amounts of pyrite. Unit contains scattered rosettes of nahcolite up to 4 inches in diameter-----	417.7 - 432.8 1,370.3-1,420.0
Nahcolite, very-light-gray to pale-yellowish-brown, translucent, thin bedded-----	432.8 - 433.4 1,420.0-1,422.0
Oil shale, pale-yellowish-brown through dusky-yellowish- brown, and dusky brown, thinly laminated. Rosettes of nahcolite up to 4 inches in diameter throughout section. Unit is grayish black between 1,429.4- 1,436.2 ft-----	(435.7-437.8) 433.4 - 438.1 1,422.0-1,437.3
Nahcolite, moderate-yellowish-brown, coarsely crystalline, bedded with rosettes at 1,438.8-1,439.2 ft-----	(438.5 - 438.7) 438.1 - 439.0 1,437.3-1,440.2
Halite, white to dusky yellowish-brown, coarsely crystalline; minor thin beds of moderate yellowish-brown oil shale---	439.0 - 439.5 1,440.2-1,443.4

Description	Depth to bottom of unit, feet (metres)
Oil shale, dark-yellowish-brown and dusky-yellow, thinly laminated, most laminae horizontal. Thin nahcolite beds and rosettes scattered throughout unit-----	1,443.4-1,473.2 (439.4-449.0)
Halite, moderate-brown to dusky-brown, transparent to translucent, coarsely crystalline. Minor amounts of nahcolite-----	1,473.2-1,477.5 (449.0-450.3)
Oil shale, dusky-yellow, very thinly laminated, interlayered with nahcolite rosettes-----	1,477.5-1,487.9 (450.3-453.5)
No recovery-----	1,487.9-1,488.9 (453.5-453.8)
Oil shale, olive-gray and dusky-yellowish-brown, fissile in part, laminae are horizontal, interlaminated and bedded with moderate brown, transparent crystalline nahcolite-----	1,488.9-1,504.0 (453.8-458.4)
Oil shale, as above with nahcolite rosettes scattered throughout unit-----	1,504.0-1,522.0 (458.4-463.9)
Nahcolite, dark-yellowish-brown, translucent to transparent, crystalline interlaminated with oil shale-----	1,522.0-1,531.0 (463.9-466.6)
Nahcolite, moderate-brown, crystalline rosettes up to 5 inches (12.4 cm) interlayered with olive-black and dusky-yellowish-brown oil shale-----	1,531.0-1,577.4 (466.6-480.8)

Description	Depth to bottom of unit, feet (metres)
No recovery-----	1,577.4-1,578.4 (480.8-481.1)
Oil shale, dusky-yellowish-brown and olive-black, contains scattered rosettes and thin beds of nahcolite-----	1,578.4-1,589.6 (481.1-484.5)
Oil shale, as above. Contains thin beds of crystalline nahcolite up to 2.4 ft (.7 m) thick-----	1,589.6-1,633.0 (484.5-479.8)
Halite, olive-black, coarsely crystalline interbedded with oil shale-----	1,633.0-1,635.3 (479.8-498.4)
Oil shale, dusky-yellowish-brown and grayish-brown, fissile to thinly laminated. White to dark-yellowish-brown crystalline nahcolite in beds and rosettes scattered throughout unit. Minor amounts of white to medium light-gray crystalline halite-----	1,635.3-1,682.8 (498.4-512.9)
No recovery-----	1,682.8-1,698.6 (512.9-517.7)
Nahcolite, moderate-brown, finely crystalline, thin bedded--	1,698.6-1,704.0 (517.7-519.4)
Halite, white to dark-gray, fine to coarsely crystalline interbedded and laminated with dusky yellow, finely crystalline nahcolite-----	1,704.0-1,719.0 (519.4-523.3)
Nahcolite, like unit at 1,698.6-1,704.0 ft (517.7-519.4 m)--	1,719.0-1,722.0 (523.3-524.9)

Description	Depth to bottom of unit, feet (metres)
Halite and nahcolite, like unit at 1,704.0-1,719.0 ft	
(523.3-524.9 m)-----	1,722.0-1,729.0 (523.9-527.0)
Oil shale, black and dark-yellowish-brown, to 1,732.0 ft	
(527.9 m) and dark- to dusky-yellowish-brown below	
1,732.0 ft (527.9 m). Minor amounts of dark-yellowish-	
brown bedded crystalline nahcolite and nahcolite	
rosettes up to 2 inches (5 cm) in diameter. Trace	
of pyrite-----	1,729.0-1,757.8 (527.0-535.8)
No recovery-----	1,757.8-1,758.0 (535.8-535.8+)
Nahcolite, pale-brown, laminated to thin bedded, opaque	
to translucent, crystalline-----	1,758.0-1,760.0 (535.8+-536.4)
Oil shale, dusky-yellowish-brown and pale-brown, fissile,	
contains nahcolite rosettes up to 5 inches (12.7 cm)	
in diameter-----	1,760.0-1,786.0 (536.4-544.4)
Nahcolite, like unit at 1,758.0-1,760.0 ft (535.8-	
536.4 m)-----	1,786.0-1,790.0 (544.4-545.6)
Oil shale, like unit at 1,760.0-1,786.0 ft (536.4-	
544.4 m)-----	1,790.0-1,791.0 (545.6-545.9)
Nahcolite, like unit at 1,758.0-1,760.0 ft (538.4- ^{5.8+}	
536.4 m)-----	1,791.0-1,795.0 (545.9-547.1)

Description	Depth to bottom of unit, feet (metres)
Oil shale, like unit at 1,760.0-1,786.0 ft (536.4-	
544.4 m)-----	1,795.0-1,804.0 (547.1-549.9)
Nahcolite, like unit at 1,758.0-1,760.0 ft (538.4-	
536.4 m)-----	1,804.0-1,814.0 (549.9-552.9)
Oil shale, like unit at 1,760.0-1,786.0 ft (536.4-	
544.4 m)-----	1,814.0-1,816.5 (552.9-553.7)
No recovery-----	1,816.5-1,818.3 (553.7-554.2)
Nahcolite, pale-brown to pale-yellowish-brown, laminated	
to thin bedded, opaque to transparent, crystalline----	1,818.3-1,832.0 (554.2-558.4)
Oil shale, olive-gray and dusky-yellowish-brown with	
minor amounts of grayish-olive, fissile, abundant	
moderate brown nahcolite rosettes up to 6 inches	
(15.2 cm)-----	1,832.0-1,839.0 (558.4-560.5)
Nahcolite, like unit at 1,818.3-1,832.0 ft (554.2-	
558.4 m)-----	1,839.0-1,848.0 (560.5-563.3)
Oil shale, like unit at 1,832.0-1,839.0 ft (558.4-	
560.5 m)-----	1,848.0-1,852.0 (563.3-564.5)
Nahcolite, like unit at 1,818.3-1,832.0 ft (554.2-	
558.4 m)-----	1,852.0-1,857.0 (564.5-566.0)

Description	Depth to bottom of unit, feet (metres)
Oil shale, like unit at 1,832.0-1,839.0 ft	
(558.4-560.5 m)-----	1,857.0-1,860.0 (566.0-566.9)
Nahcolite, like unit at 1,818.3-1,832.0 ft	
(554.2-558.4 m)-----	1,860.0-1,861.0 (566.9-567.2)
Oil shale, like unit at 1,832.0-1,839.0 ft	
(558.4-560.5 m)-----	1,861.0-1,866.0 (567.2-568.8)
Nahcolite, like unit at 1,818.3-1,832.0 ft	
(554.2-558.4 m)-----	1,866.0-1,867.0 (568.8-569.1)
Oil shale, like unit at 1,832.0-1,839.0 ft	
(558.4-560.5 m)-----	1,867.0-1,877.2 (569.1-572.2)
Nahcolite, pale-yellowish-brown, opaque, crystalline-----	1,877.2-1,879.0 (572.2-572.7)
Oil shale, dark-yellowish-brown with minor amounts of dusky-yellowish-brown, and pale-yellowish-brown below 1,907.8 ft (581.5 m), fissile. Some stringers of dusky-brown oil shale above 1,907.8 ft (581.5 m).	
Interval contains moderate brown nahcolite rosettes as large as 18 inches (46 cm) in diameter-----	1,879.0-1,914.7 (572.7-583.6)
Nahcolite, like unit at 1,877.2-1,879.0 ft	
(572.2-572.7 m)-----	1,914.7-1,915.7 (583.6-583.9)

Description	Depth to bottom of unit, feet (metres)
Oil shale, like unit at 1,879.0-1,914.7 ft	
(572.7-583.6 m). Rosettes up to 12 inches (31 cm)	
in diameter-----	1,915.7-1,930.4 (583.6-588.4)
No recovery-----	1,930.4-1,934.5 (588.4-589.6)
Oil shale, olive-gray and dark-yellowish-brown, thinly	
laminated to thinly bedded, laminae and beds	
horizontal, occasional blebby and streaked structure.	
Scattered rosettes of moderate-brown to grayish-black	
nahcolite up to 5 inches (12.7 cm) in diameter-----	1,934.5-1,939.6 (589.6-591.2)
Nahcolite, moderate-brown to grayish-black, bedded,	
fine to medium crystalline-----	1,939.6-1,941.7 (591.2-591.8)
Oil shale, like unit at 1,934.5-1,939.6 ft	
(589.6-591.2 m)-----	1,941.7-1,947.0 (591.8-593.4)
Nahcolite, like unit at 1,939.6-1,941.7 ft	
(591.2-591.8 m)-----	1,947.0-1,947.7 (593.4-593.7)
Oil shale, like unit at 1,934.5-1,939.6 ft	
(589.6-591.2 m)-----	1,947.7-1,988.0 (593.7-605.9)
Nahcolite, dark-yellowish-brown, bedded and rosettes,	
coarsely crystalline-----	1,988.0-2,023.0 (605.9-616.6)

Description	Depth to bottom of unit, feet (metres)
Oil shale, olive-gray to dusky-yellow and grayish-black, thinly laminated. Streaked and blebby structure at 2,002 ft (610.2 m), 2,007 ft (611.7 m), and 2,036 ft (620.6 m). Clay zone (fault) at 2,048.3 ft (624.3 m)--	2,023.0-2,048.3 (616.6-624.3)
Oil shale, pale-yellowish-brown with thin beds of dusky- yellowish-brown and olive-black, thinly laminated, horizontal laminae. Scattered transparent moderate- brown rosettes of nahcolite up to 6 inches (15 cm) in diameter-----	2,048.3-2,067.0 (624.3-630.0)
Oil shale, as above, unit contains beds of pale- yellowish-brown opaque crystalline nahcolite-----	2,067.0-2,086.0 (630.0-635.8)
Oil shale, olive-gray to dark-yellowish-brown, fissile. Numerous beds of finely crystalline and rosettes of coarsely crystalline grayish-brown to moderate- yellowish-brown nahcolite. Beds range up to 1 ft (30 cm) thick and rosettes up to 6 inches (15 cm). Pyrite throughout unit-----	2,086.0-2,156.0 (635.8-657.1)
Nahcolite, grayish-brown to moderate-yellowish-brown, bedded. Stringers of oil shale-----	2,156.0-2,163.5 (657.1-659.4)
Oil shale and nahcolite, like unit at 2,086.0-2,156.0 ft (635.8-657.1 m)-----	2,163.5-2,167.9 (659.4-660.1)

Description	Depth to bottom of unit, feet (metres)
No recovery-----	2,167.9-2,168.8 (660.1-661.1)
Oil shale, olive-gray to grayish-brown, grading downward to include olive black, fissile to thinly laminated. Streaked and blebby structure from 2,178.0 to 2,187.0 ft (663.9-666.6 m). Unit contains scattered beds and rosettes of nahcolite and a .1-ft (3 cm) thick bed of halite at 2,185.0 ft (666.0 m)-----	2,168.8-2,224.0 (661.1-677.9)
Nahcolite, moderate-brown, platy, transparent crystals, beds and rosettes-----	2,224.0-2,239.0 (677.0-682.4)
Oil shale, dusky-yellow-brown and olive-black alternating with laminae of moderate and pale yellowish brown, fissile with some thin bedded. Laminae generally horizontal with those at 2,255 ft (687.3 m) up to 10°. Unit contains blebs and stringers of pale- yellowish-brown oil shale. Scattered rosettes of nahcolite 6-7 inches (15-18 cm) in diameter-----	2,239.0-2,260.0 (682.4-688.8)
Oil shale, dusky-yellowish-brown with stringers and blebs of pale yellowish brown. Unit contains minor amounts of disseminated nahcolite-----	2,260.0-2,289.0 (688.8-697.7)

Description	Depth to bottom of unit, feet (metres)
Oil shale, olive-gray alternating with grayish brown, dusky brown and occasional black laminae of oil shale. Blebs of thinly laminated dusky-yellow oil shale between 2,316 and 2,318 ft (705.9-706.5 m). Irregular clast-like structures of dusky-yellowish- brown oil shale cut across and slightly disrupt laminations. Blue Marker at 2,322 ft (707.7 m)-----	2,289.0-2,322.0 (697.7-707.7)
Oil shale, olive-gray, grayish-brown, and dusky-brown interlaminated with medium-dark-gray to dark-gray shale; shale brittle and massive. Stringers of sandy limestone at 2,333.1 ft (711.1 m) and lime- stone at 2,332.6 ft (711.0 m) and 2,334.2 ft (711.5 m)-----	2,322.0-2,334.2 (707.7-711.5)
Oil shale, olive-gray, grayish-brown, and dusky-brown, thinly laminated-----	2,334.2-2,335.8 (711.5-712.0)
No recovery-----	2,335.8-2,339.8 (712.0-713.2)
Oil shale, dark- and dusky-yellowish-brown, thin to thick laminations. Below 2,347 ft (715.4 m) rock is lighter yellowish brown. Siltstone laminae at 2,345.2 ft (714.8 m) and 2,346.7 ft (715.3 m). Thinly laminated blebs of dusky-yellowish-brown oil shale between 2,339.8 ft (713.2 m) and 2,345 ft (714.8 m)-----	2,339.8-2,354.3 (713.2-717.6)

Description	Depth to bottom of unit, feet (metres)
No recovery-----	2,354.3-2,386.7 (717.6-726.5)
Oil shale, light-olive-gray and grayish-black, in alternating thin laminae with minor amounts of olive black, fissile to thin bedded, brittle-----	2,386.7-2,405.7 (727.5-733.3)
No recovery-----	2,405.7-2,406.9 (733.3-733.6)
Shale, grayish-black interlaminated with dusky-yellowish- brown oil shale. Blebs of rich oil shale at 2,413.0-2,413.4 ft (735.5-735.6 m). Thin silty layers at 2,415.5 (736.2 m) and 2,423.6 ft (738.7 m). Rock shatters and discs easily. Waxy surfaces on disc faces, typical of Garden Gulch member-----	2,406.9-2,426.5 (733.6-739.6)
No recovery-----	2,426.5-2,436.2 (739.6-742.6)
Shale, olive-black interlaminated with light-olive-brown oil shale, horizontal laminations. Core discs and shatters easily, waxy surfaces on disc faces-----	2,436.2-2,444.0 (742.6-744.9)
Oil shale, dusky-yellowish-brown with slightly darker stringers-----	2,444.0-2,460.0 (744.9-749.8)
Shale, olive-black, olive-gray, and dusky-yellowish-brown. Dusky gray laminated shale at 2,468-2,482 ft (752.2-756.5 m)-----	2,460.0-2,484.5 (749.8-757.3)

Description	Depth to bottom of unit, feet (metres)
No recovery-----	2,484.5-2,487.5 (757.3-758.2)
Shale, light-olive-gray laminated with dark gray to olive gray, horizontal laminations, occasional laminae of dusky-yellow oil shale. Core discs along waxy coated laminae. Calcareous to slightly calcareous from 2,491.0 to 2,502.0 ft (759.3 to 762.6 m)-----	2,487.5-2,539.6 (758.2-774.1)
No recovery-----	2,539.6-2,547.6 (774.1-776.5)
TD of core-----	2,547.6 (776.5)
TD for hole-----	2,610 (795.5)